

### ABSTRACT OF THE DISCLOSURE

A wireless sensor system includes a passive sensor apparatus configured to be embedded within a concrete structure to monitor infiltration of contaminants into the structure. The sensor apparatus includes charging circuitry and a plurality of sensors respectively configured to measure environmental parameters of the structure which include information related to the infiltration of contaminants into the structure. A reader apparatus is communicatively coupled to the sensor apparatus, the reader apparatus being configured to provide power to the charging circuitry during measurements of the environmental parameters by the sensors. The reader apparatus is configured to independently interrogate individual ones of the sensors to obtain information measured by the individual sensors. The reader apparatus is configured to generate an induction field to energize the sensor apparatus. Information measured by the sensor apparatus is transmitted to the reader apparatus via a response signal that is superimposed on a return induction field generated by the sensor apparatus. Methods of monitoring structural integrity of the structure are also provided.